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Research Article

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Intellectual property and agricultural trade: Producer perceptions of tea and coffee as potential geographical indications

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Abstract: Kenya tea and coffee are major foreign exchange earners and have high reputation among consumers in the international market. Faced by declining prices and competition from other sub-sectors, production area under these commodities has been declining. Use of intellectual property (IP) rights to protect and market agricultural commodities has been on the increase. Geographical indications as IP have been successfully implemented in developed countries and increasingly in developing countries. The study assesses producers' awareness and perceptions of territorial-based qualities and the influence on product profits from the two export beverage crops, tea and coffee. Factor analysis was conducted on Likert scale perception questions administered to producers of coffee and tea from Muranga and Kirinyaga, respectively, in the Central region of Kenya. Producers of the two products were aware of the uniqueness of their products and their geographical source. Only perceptions related to market access in coffee and tea, and policies and rules as well as role of county government in coffee positively influenced income. Rather than have GI as a certification trademark, a prescriptive sui generis law would provide the required streamlining needed for collective participation of various actors along the value chain of potential GI products

Keywords: Factor analysis, geographical indications, export crops, producer attitudes, profit

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1 Introduction

Kenya coffee and tea are among the major foreign exchange earners. Tea is the main export commodity accounting for, on average, 25% of total domestic export earnings (KNBS 2018), with the country being the largest tea exporter in the world (Blakeney and Mengistie 2012). Coffee (unroasted) on the other hand contributes at least 4% of the total domestic export earnings (KNBS 2018).

In the international market, Kenya tea and coffee are reputed to have unique characteristics linked to region of production (Bagal et al. 2013; Blakeney and Mengistie 2012), leading to rise in participation in specialty markets. However, specialty markets form a very small proportion of the outlet, which are often factory-led initiatives. According to marketers and buyers interviewed, consumers of Kenya tea and coffee often request for information regarding the region of production and other distinguishing attributes. These characteristics are used to market the beverages, without necessarily having the resulting premium prices trickling down proportionately to the producers, especially the majority who sell their products through the tea or coffee auction and not in specialty markets. Often, this is due to a lack of producer awareness of the premium accruing from the quality of their products.

A product's pre-existing reputation popularises it in the market. Similarly, the subsequent actions of the owners or producers of the product can appreciate or depreciate the value of the product in the market (Coulet 2012: 101–119). In view of low market prices and high production costs, coffee producers are replacing the existing (mostly Arabica-based) varieties with new varieties that have lower production costs. However, the new varieties do not necessarily possess the taste quality attributes that consumers are willing to pay for, thereby leading to value depreciation and therefore, a further decline in prices (Bagal et al. 2013).

In producing standardized products or selling products with pre-existing reputation as standard goods

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with limited knowledge about the reputation these products have in the market, agricultural producers must contend with the economic power of the players beyond the farm gate, including processors, marketers, traders, middlemen (Blakeney et al. 2012). To overcome this, product differentiation can be a viable option for adding value to the unique export agricultural products that have pre-existing reputation.

Geographical indications (GIs), as a form of intellectual property rights (IPR), are signs that identify a product whose quality, reputation or other characteristics are linked essentially to the region of production. The generic description of GI given by Article 22 of TRIPs puts emphasis on attribution of the product characteristics to the natural and human links inherent in the region of production. Therefore, unlike other IPR, the distinguishing characteristic of GI is that the protected subject matter is related to the product itself and not dependent on a specific right-holder. Thus, rather than protect the product or production methods, GIs as IPR confer the exclusive right to use a distinctive sign that identifies a product to all the producers in the given region (Addor and Grazioli 2002).

Considering this distinction, successful protection and marketing of origin products using GI registration (for example, in the EU) is often attributed to, among others, effective and well-developed coordination and participation of key stakeholders along the supply chain as well as the relevant administrative authorities and institutions (Dagne 2015).

Theoretically, different models conclude that the effect of strengthening IP laws for agricultural trade are contradictory and/or ambiguous (Campi and Duenas 2014; Grossman and Lai 2004). Opponents of strengthening IP laws for agricultural products argue that it would hamper free flow of information needed to advance rural societies in developing countries or block technology transfers from industrialised countries to the developing countries. Developing countries also fear that stronger protection and enforcement of IP would result in prohibitive premium prices resulting in anti-competition practices (Olwan 2013). Olwan (2013) further points out that rent transfer may result especially where foreign firms are involved in the marketing chain (as is the case with Kenya Coffee), as more of the profits would be retained abroad rather than accrue to producers. Tea producers raised concern in having a regional based GI as opposed to the current factory level standards as it may reduce competition among the factories and maybe compromise quality.

It is evident that use of any IP on its own (including GI), without enforcement and other supporting features in place, may not result in economic development for developing countries, even where the product has a pre-existing reputation. However, considering that some producers are already benefitting from specialty coffee and tea trade, there is opportunity for more coordinated collective reputation and hence higher prices to producers in a given region through the exclusive rights accorded by GI protection.

Collective participation in protecting these characteristics by all value chain actors would increase ownership as well as ensure that the producers, on the supply end of the chain, consciously protect the environment and characteristics that contribute to the unique product qualities (Winfree and McCluskey 2005). The government would benefit from strengthening the laws that enhance the collective participation through sustainable production of the coffee and tea and hence ensure longevity and/or sustained income from exports benefiting the producers. The supply chain actors would all benefit through assured quality of the products hence reputation in the product market.

In addition, it is important to combine assessment of the product uniqueness with an understanding of institutional factors that would influence the success of a GI registration (Bramley and Biénabe 2013; Giovannucci et al. 2009).

Coffee and tea are similar in as far as they are produced by both large- and small-scale farmers, with some level of collective action among the latter especially in the organisation of the factories to which they deliver their harvest. The small-scale producers are required to register with a cooperative society (for coffee) or factory (tea) as a means of marketing their produce (Government of Kenya 2013). Each of the two products also has distinct characteristics, institutions and stakeholders, providing a good case for evaluating the role of geographical indications as IP in international trade. The producers' experience and attitudes created over time through the marketing of the two commodities would mould their expectation regarding benefits of effectiveness of GI protection of the products. Unlike consumers whose preferences can quickly change in the short term, a producer's decision to engage in geographical indication protection has long-term effects on their production decisions based on their profit maximising behaviour.

This paper aims at identifying producer awareness of and attitudes towards the territorial uniqueness of two export-market commodities, and the influence of these perceptions on profits received from the commodities. The paper tests the hypothesis that producer perceptions of the uniqueness of their products influence profits they

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currently receive. The results of the study will contribute to the debate on the potential of geographical indications as IP in the protection of internationally traded commodities from Kenya.

Perceptions and general awareness provide indications of producers' subjective assessment of the reputation and market interventions they view as important for their respective products. It is these attitudes that appreciate or depreciate the pre-existing reputation of a product in the market. The products of focus in the study and the production regions with perceived uniqueness are coffee, produced in Muranga and tea, produced in Kirinyaga County, both in the Central region of Kenya. The regions lie at the foot of the Aberdare Ranges (coffee) and Mt. Kenya (both coffee and tea) catchments.

2 Methodology

2.1 Theoretical considerations

Assessment of producer attitudes and perceptions is founded on the theories of profit maximisation as well as planned behaviour. According to the theory of planned behaviour, an individual's intentions and actions are shaped by their attitudes towards a situation, their subjective norms and perceived ability to perform the action, relating to the level of control they have (Ajzen 2005). Behaviour and attitudes of agri-food producers towards the environment and its management determine whether they will engage in decisions that either increase or decrease environment quality (Gifford and Sussman 2012). According to the theory, perceived behaviour can influence actions indirectly, hence be used to predict the actual decisions the individual would take (Ajzen 2005).

2.2 Model specification

Since individuals tend to over-report perceptions, use of a 5-point Likert scale questions provided a firm basis for eliciting attitudes and perception data. In some instances, awareness and attitudes are necessary steps towards predicting producer decision in adopting an environmentally related component (Floress et al. 2017).

Using commodity specific attributes, questions aimed at eliciting producer perceptions towards the geographical link, market structure, role of policies and institutions in the respective export market. The factors were summarised based on the following matrix equation specification following Joliffe (2002) and Pennings and Leuthold (2000):

$$F=\Lambda L+\delta \quad (1)$$

Where F is a *qx1* vector of observed variables; Λ is a *qxn* matrix of regression coefficients (factor loadings) to be estimated; L is a *nx1* vector of latent variables (factors) that are estimated along with coefficients; and δ is a *qx1* vector of specific error terms corresponding to the variables to be observed.

The eigen value for a given factor measured the variance in all the variables accounted for by that factor. Only those factors with an Eigen value greater than one were retained (Field 2013; Kaiser 1960). The factors were then renamed based on the variables loading on each of them.

Factor scores were generated using the Bartlett's method, which produces unbiased estimates that have a mean of zero (0) and a standard deviation of one (1). These factor scores were then used as predictor or dependent variables in subsequent profit regression equations in order to examine their relationship with the profit for each commodity through linear regression (DiStefano et al. 2009; Field 2013; Howley and Dillon 2012). The linear regression was specified as:

$$\sum^{I}_{(i=1)} \text{Profit}_i = \beta`X+\gamma'W+\varepsilon_i \quad (2)$$

Where $Profit_i$ stands for the gross margin of the i^{th} product (gross margin = *Total revenue – Total variable costs*); I is the total number of respondents in each study site; X is a vector of explanatory variables relating to the respondent; W is a vector of factor scores as explanatory variables for each of the respondents; β' and are vectors of regression parameters to be estimated and the ε_I are vectors of disturbance terms in the regression.

The aim of conducting the analysis was to determine whether the current profits producers receive are significantly related to their perceptions regarding product uniqueness. Since the producers are only active on the supply end, their perceptions also provide their view of the effectiveness of the rest of the supply chain in the marketing of their respective products.

2.3 Study site and sampling

The study sites were selected based on the results of a characterisation study that ranked the two products as important and potential GI products (Maina et al. 2018). The random sample comprised 135 respondents from Murang'a County coffee growing (upper and middle)

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regions and 134 from three tea production regions of Kirinyaga County (Figure 1).

2.4 Data collection

A semi-structured questionnaire was used to gather qualitative and quantitative primary data from the two study counties. Data was collected on: (i) household demographics; (ii) farm and production related information; (iii) costs of production, output quantities and prices; as well as (iv) producer perceptions relating to the geographical linkage, market dynamics, and policy and institutional support. The survey was conducted between June and August 2015.

2.5 Data analysis, factor retention, and adequacy of sampling size

Data entry and analysis was done using SPSS v24. Factors were extracted using principal component method with varimax rotation. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) was greater than 0.5 in both cases, indicating the appropriateness of factor analysis in yielding distinct and reliable factors from the analysis (Field 2013). To determine the adequacy of the sample size, communalities (shared variance) of the variables that were greater than 0.5 were considered sufficient (Field 2013; MacCallum et al. 1999). The factor loadings retained are those that had values greater than 0.4 (Stevens 2002).

2.6 Description of variables used in regression analysis

Calculation of producer gross margins for each product was based on the production and sales data for the year 2014. The resulting gross margins were used as a proxy for profit in the regression equation. The explanatory variables for the regression analysis comprised producer-related variables and attitudes related to potential stakeholder involvement in GI protection of the respective products (Table 1). The factor scores obtained from each of the factor analysis were also part of the explanatory variables.

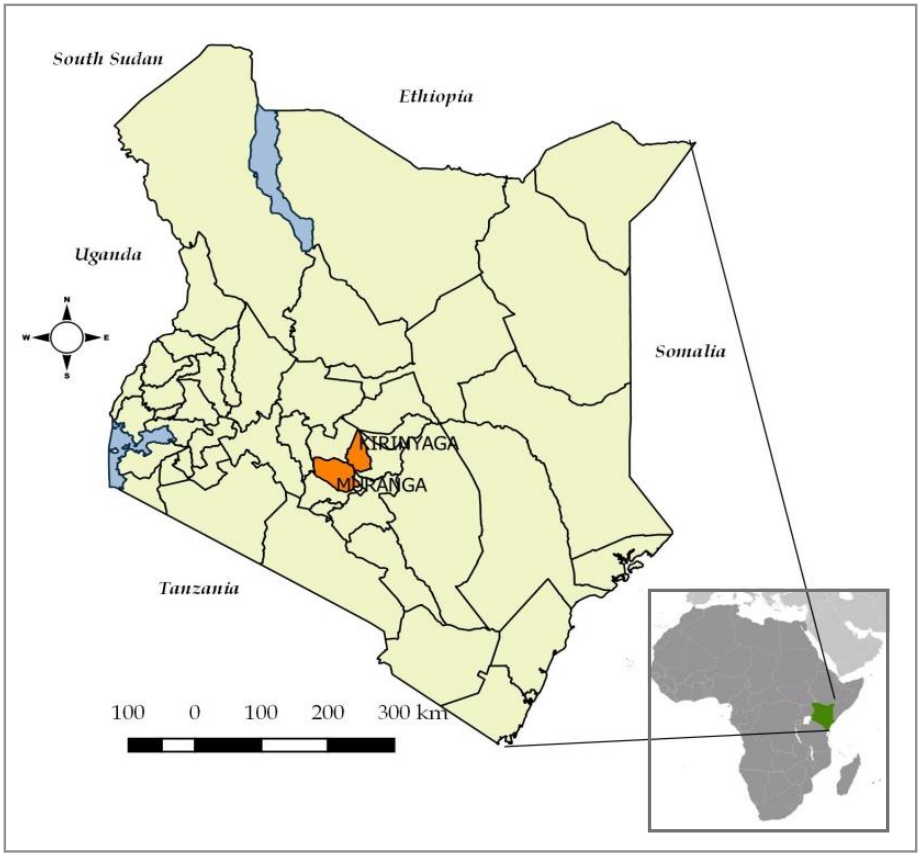

Figure 1: Map of Kenya depicting the two study counties (Muranga and Kirinyaga (Inset: Map of Africa showing position of Kenya)

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Table 1: Description of producer related variables and attitudes influencing income

Explanatory variables	Variable type/coding	Coffee (n=135)	Tea (n=134)
Zone	Dummy (*1=upper region/ Kimunye, 2=other*)	53% in upper region	34% from Kimunye catchment
% of producers who perceive county govt support as important	Dummy (*0,1: 1=Yes*)	81%	
% of producers who perceive coffee directorate support as important	Dummy (*0,1: 1=Yes*)	46% support	
% of producers who perceive coffee millers support as important	Dummy (*0,1: 1=Yes*)	35% support	
Mean total land size (acres)	Number		1.4 acres
Average years farming in region	Number	30 years	
Willingness to contribute for protection	Dummy (*0,1: 1=Yes*)	82% willing to contribute	78% willing to contribute
Member of producer association	Dummy (*0,1: 1=Yes*)	76% are members	
Average size of household	Number	4 members	4 members

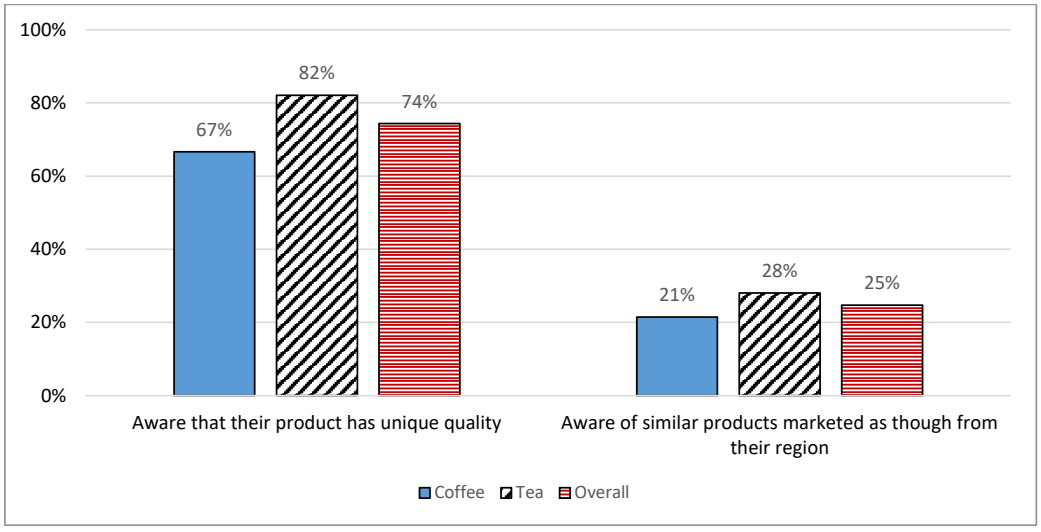

Figure 2: Producers' awareness of the uniqueness of their respective products

Ethical approval: The conducted research is not related to either human or animal use.

3 Results

3.1 Producer awareness of product uniqueness

The producers in the two counties generally perceived their respective products to be unique. A lower proportion of coffee producers (68%) perceived their products to possess unique territorial-based attributes (Figure 2). During focused group discussions, producers in the coffee and tea growing regions attributed the quality of their products more to individual on-farm management practices than to characteristics of the production region.

Approximately 25% of the respondents were aware of some form of free riding on the reputation of their respective products (Figure 2). The characteristics of the marketing channels for each of the products may contribute to producers' perception on free riding. Coffee and tea have clearly defined marketing chains that require attribution of the commodity to a specific factor or society of origin. Free riding is often associated with decreased incomes accruing to the actual producers, as the market quality (hence reputation) is not always assured.

Taste of final product was the single most common characteristic associated with the product uniqueness cited by at least 80% of respondents in each study area. The source of the uniqueness was attributed mainly to the soil characteristics and weather (temperature and rainfall) for both crops. Between 5% and 8% of the producers of both crops attributed the uniqueness to management of the

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factories and processing activities (Figure 3). There were no traditional knowledge/cultural practices identified by the producers as being a source of the unique characteristics. Both products were introduced into the country in the 20th century and were previously not grown by the natives. Further, local consumption accounts for less than 20% of marketed volumes for both products. The presence (or lack) of traditional knowledge in production of the unique products is important in development of national policies on protection of geographical indications as discussed by Dagne (2015).

3.2 Factor analysis of producers' perceptions of geographical indication-related attributes of their products

Using Kaiser's criterion, six factors were retained for each of the commodities accounting for between 62.7% and 70.2% of the variance in the original variables for tea and coffee respectively (Table 2). The factors covering market access were retained for both commodities while importance of microclimate was retained for coffee. Market dynamics (especially access to markets and prices) are important in shaping the producers' behaviour while micro-climate emphasises the coffee producers link between the microclimate and manifestation of the unique characteristics (Van Huylenbroeck et al. 2009).

In the coffee analysis, perceptions on the role of private sector and extension services loaded on the first factor while perceptions on market access and policies and rules loaded on the third and fourth factors respectively. As noted by Bagal et al. (2013), the private sector plays a major role in processing and marketing of coffee in Kenya, following liberalisation and the collapse Kenya Planters Cooperative Union (KPCU). Beyond the wet-milling factories run by small-scale producer associations, the private sector conducts almost all other functions including selling and remitting payment back to the factories. It is worth noting that although the producers cited low prices, minimum guaranteed returns loaded on the fifth factor, meaning it accounted for much lower variance. The producers indicated that having minimum guaranteed returns might deny them higher prices brought about by competition and specialty in the coffee market.

Factor analysis results for tea differed from those of coffee, depicting the difference in management of the two commodities' markets. Importance of information on prices as well as market prices and access loaded on the first two factors for tea production respectively. Tea production by small-scale producers is managed under the Kenya Tea Development Agency (KTDA) unlike coffee where different factories have different millers and marketers for their berries

Although participation in producer association was among the variables retained, collective marketing was not retained for any of the two export products. Collective action is of importance for the success of GI registration (Bramley and Biénabe 2013; Bramley et al. 2009: 109–141; Giovannucci et al. 2009; Vandecandelaere et al. 2010). This therefore poses a capacity building need to enable the producers successfully work together for sustainability of the product qualities and reputation.

As expected, producers are driven by the activities along the supply chain and the success of registration of potential GI will be determined by the efficiency of the activities thereof. Therefore, for there to be success

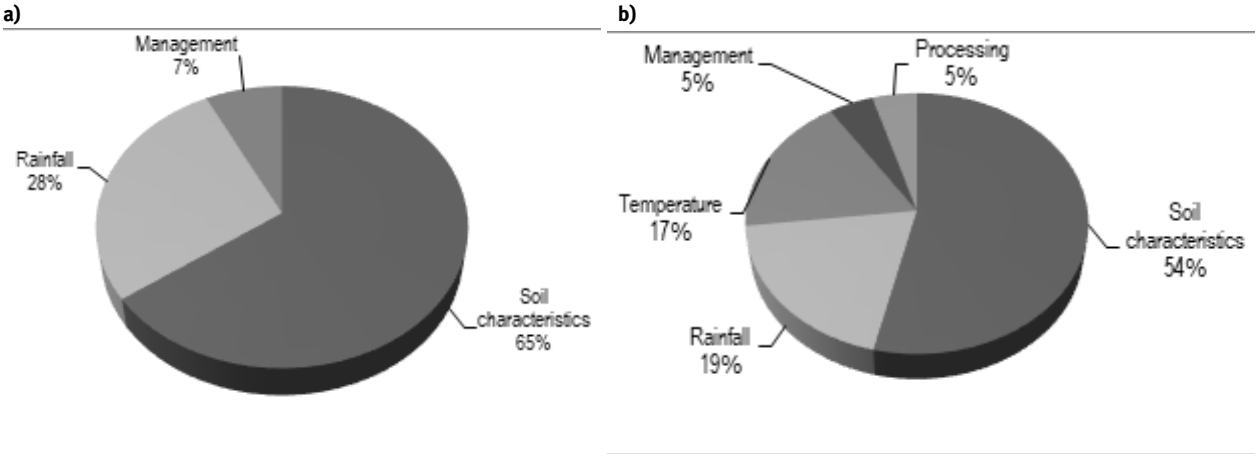

Figure 3: Producer perceptions on the sources of uniqueness of (a) coffee and (b) tea as potential GI products

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in enhancing environmental sustainability through GI registration of potential products, there is need to streamline the activities beyond the farm gate.

Regression analysis of factors influencing producers' perceptions

The producers' profits, derived from gross margin for tea and coffee produced in year 2014/2015, were regressed against the producers' socio-economic variables (Table 1) as well as the factor scores obtained from the respective analysis (Table 2). The region of production had a significant relationship with profit for both crops (Table 3 and Table 4). This confirms that within the same County, producers received different commodity prices based on the zone.

Factor scores on market prices (FS3) and county government support (FS6) had a significant relationship

Table 2: Factor analysis of producer perceptions of coffee and tea as potential GI export beverage crops

	COFFEE		**TEA**	
Factor No.	Factor description and Variable Importance of …	Explained variance and factor loading	Factor description and Variable Importance of …	Explained variance and factor loading
1	*Private sector and extension (α=0.73)*	*Exp σ²=12.88*	*Producer association (α=0.46)*	*Exp σ²=9.70*
	Private sector participation	0.77	Being member of producer association	0.75
	Extension services	0.77	Devolve to include producers more	0.58
	Zone of production	0.63	Private sector participation	0.55
	Being member of producer association	0.59		
2	*Micro-climate (α=0.62)*	*Exp σ²=10.61*	*Micro-climate in the region*	*Exp σ²=7.11*
	Micro-climate in the region	0.81	Microclimate in the region	0.87
	Current management practices	0.70		
	Ancestral involvement in coffee production	0.65		
3	*Market prices and access (α=0.74)*	*Exp σ²=10.21*	*Market price and access (α=0.60)*	*Exp σ²=11.65*
	GI protection and better market prices	0.87	GI protection and better market prices	0.75
	GI protection and better market access	0.83	GI protection and better market access	0.69
			Rainfall and seasonal patterns	0.65
4	*Rules and policies (α=0.64)*	*Exp σ²=9.71*	*Policies and rules (α=0.53)*	*Exp σ²=10.55*
	Having rules regarding quality	0.84	Support from the state policies	0.82
	Increased support from the state policies	0.80	Having rules regarding quality	0.74
5	*Minimum guaranteed returns (α=0.57)*	*Exp σ²=9.69*	*Price information (α=0.70)*	*Exp σ²=13.00*
	Minimum guaranteed returns	0.83	Information on expected prices	0.83
	Coffee protection by region	0.76	Minimum guaranteed price	0.83
	Cost of GI	0.75	Protection of commodity as a GI	0.78
	Receiving information on prices	0.64		
6	*County government support (α=0.46)*	*Exp σ²=8.70*	*County government support (α=0.54)*	*Exp σ²=10.73*
	Support from governor's office	0.82	Support from governor's office	0.78
	Support from administrative office	0.74	Support from administrative office	0.75
			Extension services	0.47
	Total variance explained	=70.2%		=62.7%
	Kaiser-Meyer-Olkin Measure of Sampling Adequacy	=0.614		=0.608
	Bartlett's Test of Sphericity Chi-Square (degrees of freedom)	525.6*** (136)		=368.6*** (120)

****Chi-square test is significant at less than 1% probability; Exp σ²= Explained variance; α=Cronbach's alpha*
Factors extracted using principal component analysis, Varimax rotation with Kaiser normalization;
Source: Household survey June – August 2015

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Table 3: Regression parameter estimates for coffee producers' profit

Explanatory variables	Parameter estimates	Std. error
(Constant)	12,471.3	13,667.9
Zone	-9,830.6**	4,540.9
Coffee directorate support	-9,471.7*	5,095.5
Coffee millers support	19,880.4***	5,221.8
Years farming in region	273.0*	152.0
Willingness to contribute for protection	-10,724.2*	6,343.0
Member of producer association	14,075.7**	5,431.7
Size of household	-2,877.4***	1,061.7
Factor score 1 – Role of private sector and extension	-1,383.4	2,179.5
Factor score 2 – Micro-climate	-226.6	2,246.9
Factor score 3 – Market access and prices	6,393.8***	2,435.4
Factor score 4 – Rules and policies	-1,975.6	2,365.0
Factor score 5 – minimum guaranteed returns	-818.6	2,247.9
Factor score 6 – Public sector support	6,445.5***	2,285.1
N	128	
R squared	0.303	
F-statistic	3.243***	

*, **, *** *denotes significance at 10%, 5% and 1% levels*

Table 4: Regression parameter estimates for tea producers' profit

Explanatory variables	Parameter estimates	Std. error
(Constant)	74,594.8	27,878.4
Zone	-64,480.1***	16,839.7
Total land size	43,607.2***	7,467.0
Years farming in region		
Willingness to contribute for protection	51,041.6***	19,392.7
Member of producer association		
Size of household	-10,669.1**	4,729.2
Factor score 1 – Price information	3,537.5	9,390.0
Factor score 2 – Market price and access	-1,411.4	7,978.4
Factor score 3 – Public sector support	-16,775.8**	7,968.8
Factor score 4 – Policies and rules	-1,267.9	7,503.5
Factor score 5 – Producer association and private sector	-5,883.1	7,858.2
Factor score 6 – Micro-climate	3,815.3	8,054.8
N	112	
R squared	0.361	
F-statistic	5.715***	

, **,* denotes significance at 10%, 5% and 1% levels*

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with profit for coffee production. Interestingly, profit from tea production had a negative relationship with perception on the importance of county government and administrative office support (FS3). The regression analysis gave low R^2 values, agreeing with literature that states that in studies trying to predict human behaviour, the R^2 values are bound to be low. This is mainly due to heterogeneity in individuals' attitudes, actions and behaviours (Pindyck and Rubinfeld 1991).

Among coffee producers, awareness of uniqueness of the product traits as well as willingness to contribute towards GI protection both had a negative significant relationship with profit. On the other hand, tea producers' willingness to contribute for protection was positively related with the profit derived from tea production (Table 3). Coffee producers who already receive high prices may not see the additional benefits that would accrue from the protection.

4 Discussion and conclusion

Knowledge of product uniqueness by coffee producers did not have a significant relationship with profits received. This underscores the fact that the unique attributes in a product are not a panacea to marketing challenges (Giovannucci et al. 2009; Josling 2006). The steadfast and effective support by the state, county governments, supply chain actors e.t.c. is needed in the two value chains to assure producers. As profit maximising individuals, producers will rarely invest in a venture that does not contribute positively to their profits.

In the analysis, perceptions of producers relating to protecting their unique products as GI were summarised in six factors. The initial, almost similar variables, yielded different summaries using factor analysis showing the dynamics within each of the study products, although somehow similar in their organisation. The role of the private sector was important in coffee production while accessing market price information was important in tea production.

The analysis presented implies that producers of export tea and coffee are aware of the dynamics that would influence the success of the products as GIs. Policies and rules were not nearly as important as market access and prices in both sub-sectors as well as the role of private sector in coffee production. The producers, being the custodians of the coffee and tea biodiversity in the value chain, identify the importance of coordination between different actors at market, extension and production levels. Dagne (2015) emphasizes the importance of establishing institutional, legal and organisational framework to the success of a functional GI system.

From the regression analysis, not all producer perceptions influence incomes currently and this could be attributed to the gap between the international prices received for the raw products and the actual prices producers receive due to the product uniqueness (Bagal et al. 2013). The differences in the two sub-sectors emphasises the importance of having a country *sui generis* GI law as an IP, which provides uniform guidance on the actions required to ensure collective reputation of a product as well as define the exclusivity of the benefit sharing. The law should provide guidance on interaction of the stakeholders in each sub-sector, to enhance the collective reputation.

The analysis shows that currently producers view GI as a means to overcome current challenges in management and enforcement of institutional arrangements. The first step for each of the commodities would be to ensure enforcement of policies and regulatory frameworks that would govern the markets and institutions within each sub-sector. This would then provide the producers the initial assurance needed in order to take the next step of differentiating the products using legal mechanisms like GI. In Kenya, the codes of practice that govern the Kenya Coffee and Kenya Tea certification marks provide for this need. However, not all producer cooperatives adhere to these standards. The Agriculture and Food Authority are increasing efforts towards effective enforcement and monitoring. The certification mark applies to all coffee or tea production regions, regardless of place-based quality traits.

The study focused on producer perceptions, as they are the ones who make long-term investment in ensuring consistency in product quality. Further studies are required to determine the consumer perceptions relating to protecting Kenya coffee and tea as geographical indications. Considering only a small proportion (<20%) of both commodities is consumed locally, the consumer study should target the international coffee and tea market.

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